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ON SOME EARTHWORMS FROM BURMA

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Five specimens, hitherto unidentified although collected some years ago, of four Burmese or Indo-Burmese species from the American Museum of Natural History have now been examined. Study of this meager material has enabled extension of geographical range and recording of additional information as to taxonomically important characteristics of each of the species, as well as a reconsideration of the status of several other species.

The author's thanks are extended to Mr. John C. Armstrong, Assistant Curator of Invertebrates at the American Museum of Natural History, for the opportunity of studying these specimens.

MEGASCOLECIDAE

EUTYPHOEUS MICHAELSEN, 1900

Eutyphoeus constrictus Gates, 1929

Specimen Examined: Mansum, Burma, January 23, 1935, one clitellate specimen. Vernay-Hopwood Chindwin Expedition. A.M.N.H. No. 6657

External Characteristics: Length, *ca.* 161 mm. Diameter, 4 mm. Number of segments, *ca.* 222 (last segment not setigerous but not a normal anal segment, pit-like depressions probably indicating sites of former openings of setal follicles, slight reorganization of last segment after amputation of a posterior portion?). Pigmentation unrecognizable (alcoholic preservation, but appearance same as that of specimens of *Tonoscolex* sp., always unpigmented, from the same tube). Prostomium prolobous, but two well-marked furrows passing to 1/2 mark off the equivalent of a tongue (combined prolobous and tanylobous?).

Secondary annulations well marked, one presetal and one postsetal secondary furrow per segment from vi posteriorly.

Setae begin on ii; $ab < cd < bc < aa$, $dd\ ca. = \frac{1}{2}$ C. First dorsal pore on 10/11, a pore-like but non-functional marking on 9/10. Clitellum annular, on xiv–xvii, indicated by a smoother, creamier appearance of the epidermis; pores of 14/15–16/17 occluded but sites obvious, intersegmental furrows recognizable and especially clearly on the ventrum.

Spermathecal pores very small, transverse slits, on 7/8, slightly lateral to *b* lines. Female pores (both) quite obvious, slightly in front of *a* setae. Male pores unrecognizable but there are apertures about on *b* sites, each at tip of a very slightly raised and very small, rather conical protuberance. Each protuberance is on a small porophore of rather oval outline, pointed posteriorly, clearly demarcated by a slight furrow, reaching mesially to *a* line, posteriorly to 17/18 and anteriorly to presetal secondary furrow.

Genital markings lacking.

INTERNAL ANATOMY: Rudimentary (?) lateral intestinal caeca in region of xxv. Typhlosole begins in region of xxv–xxvii. Ventral caeca recognizable only in xxxv–xxxvi. Supra-intestinal glands in lxxxi–lxxxiv, the anteriormost very small.

Dorsal blood vessel continued into iii, with last hearts in xiii, and lateral loops in v–viii. Hearts of xi bound down to gut.

Testis sac of xi apparently ventral but empty. Seminal vesicles of xii small, well down in coelomic cavity. Prostates in xvii–xviii. Bulbus ejaculatorius coelomic, relatively fairly large but soft and whitish. Penial setae 1+ mm. long.

Spermathecae small, below gizzard; diverticula, lateral and median, nearly spheroidal to slightly digitiform.

REMARKS: Except as is noted to the contrary above, other characteristics are as usual in the genus.

The lateral diverticulum of the left spermatheca has a spermatozoal iridescence, indicating that copulation had taken place. Presumably at time of collection the worm was in an early stage of postsexual clitellar regression.

Male funnels were not recognized in x. One functional and two reserve setae were removed. Tip of functional shaft was split and softened. Tips of reserve shafts also seemed softened but are rounded and with several small spines or teeth protuberant therefrom (disintegration artefacts?).

The species is known only from Burma and hitherto only in a small region extending from Meiktila south to Toungoo.

Mansum presumably is in Myitkyina district, and probably is about 12 to 14 miles from Gora. It is said to be at an altitude of 3200 feet, in dense rain forest of bamboo (Carter, 1943, p. 102).

PERIONYX E. PERRIER, 1872

Perionyx m'intoshi Beddard, 1883

SPECIMEN EXAMINED: Gora, Myitkyina district, Burma, January 26, 1935, one aclitellate specimen. Brought in by natives to H. C. Raven. A.M.N.H. No. 6657. (Another tube with the same label has a posterior fragment, broken off behind xviii, presumably of the same species.)

EXTERNAL CHARACTERISTICS: Length, 147 mm. (of posterior fragment, 200 mm.). Diameter, 10 mm. Number of segments, 120. The last segment is fully setigerous, the posterior half, just including the setae, with fine, longitudinal furrows and epidermis with more of an appearance of an intestinal than an external epithelium, presumably indicative of enteroparietal healing after amputation of a posterior portion. (The posterior fragment has *ca.* 180 segments, with several metameric abnormalities and a growth zone where posteriormost segments are short, demarcated ventrally, but not dorsally, and apparently with metameric anomalies, the anus terminal.) Pigment unrecognizable (alcoholic preservation) though probably originally present. Prostomium epilobous, *ca.* $\frac{1}{2}$, tongue open. Setae: 33/ii, 49/iii, 53+(gaps)/iv, 75+/xviii, 71+/xii, 64+/xx, 67/xxi, viii/6.

Nephropores first recognizable on ii, dorsally located, in two rather irregularly zigzagged rows, usually one to two intersetal intervals between locations on successive segments, posteriorly *ca.* 14 to 15 intersetal intervals from middorsal line. Except for these readily visible and easily identified openings no other nephropores were detected. First dorsal pore in 5/6.

Spermathecal pores on 7/8–8/9. Female pore not definitely recognizable, possibly median (?).

A transverse groove equatorially on xviii is *ca.* 10+ intersetal intervals wide (on xix). In the groove there are just visible tips of six setae. Male pores minute, slightly larger than the apertures of the setal follicles and on the posterior wall of the groove dorsally. No indication of development of a male field.

INTERNAL ANATOMY: Septa 6/7–19/20 thickly muscular. Gizzard in vi. Intestinal origin in region of 19/20, a valve present in xix. No typhlosole. Last hearts in xiii. Subneural trunk present.

Testes, of x and xi, are long and slenderly manicate. Seminal vesicles, in each of xi and xii, are united into a single, horseshoe-shaped mass. From the posterior face of the vesicle of xi, on each side, there is marked off a single, discrete lobe (equivalent to the primary ampulla). A pair of quite small, discrete vesicles present in xiii, a pair of filamentous, rudimentary vesicles in xiv. Prostates confined to xviii, deeply incised into a number of flattened and leaf-like lobes of varying size with stalks of varying length. (The lobes are perhaps more easily recognizable than usual owing to softening of connective tissue between.) Vas deferens can be traced into one of the anterior lobes basally.

Spermathecae, apparently juvenile, with duct almost confined to body wall, no indications of diverticula recognized.

REMARKS: *Perionyx m'intoshi* was erected on a single specimen from "Akhyab," the name of a coastal town as well as of an administrative district on the far side of the western mountain wall of Burma. The type apparently has been lost, as Stephenson (1931, p. 176) reported that it was not in the British Museum. The species had not again been found in Burma in spite of various attempts by the present author, either in Akyab and the jungles beyond that town or in other parts of the west hills.

The only description of the type gives no information as to setal numbers, nephropores, number of nephridia, or gizzard, and seminal vesicles are called testes. Although spermathecal pores are said in the text to be on 7/8–8/9, they are shown in figure 3 on 6/7–7/8. The specimen was thought to be immature. However, the female pore was recognizable, as well as a yellow male field extending shortly onto xvii and xix, and the color of xii–xxiii was somewhat different from that of other segments. Presumably then the worm was either in a late presexual, or in a postsexual, aclitellate stage.

The size of the spermathecae of the Gora specimen is such as to indicate that this worm was not so mature as the type. If so, it is conceivable that later, differential growth, especially in a small region between the male pores and the setal circle of the Gora worm, could dislocate a ventral portion of the setal circle of xviii anteriorly and thus produce a condition as in the male field of the type. Aside from differences in the male area, there are no

morphological indications against identification of the present specimen as *m'intoshi.*

Prof. K. N. Bahl has kindly examined the posterior fragment and states (*in litt.*), "There is a pair of nephridia—holonephridia—in each segment, each with a preseptal funnel and a postseptal body."

Gora is some 500 miles from the supposed type locality and, further, is east of the Chindwin River. Presumably *m'intoshi* is present throughout the hills of the region between the two localities. Probably much less is known about the earthworms of those western hills, from the Sandoway through the Kyaukpyu, Akyab, Arakan Hills, Chin Hills, Upper Chindwin and Myitkyina districts, to the Himalayas, than of the other portions of the Burmese mainland.

As indicated below (1), the species seems also to be present in the Assam plateau, the broad, finger-like projection into India of the western mountain wall. Other supposed Indian distribution of the species is considered below (3).

Further Notes on the Species

1. Nine specimens, in poor condition; Dumpep, Khasi Hills, Assam, "under stones on dried up bank of Wasarah stream"; March 31, 1930; J. L. Bhaduri; Indian Museum, Calcutta.

External Characteristics: Length, to 310 mm. Diameter, to 11 mm. Both dorsum and ventrum appear to be blue but pigment in and around circular muscle layer is red, denser dorsally. Setae: 44/ii, 53/iii, 54/viii, 66/xii, 53/xx, viii/2, xix/4; 60/viii, 61/xii, 66/xx, viii/3, xix/2; 51/ii, 52/iii, 76/viii, 75/xii, 61/xx, viii/3, xix/3 (a juvenile 6 mm. thick). Nephropores, apparently only one pair per segment, near anterior margins of segments, not in regular longitudinal ranks. On one worm on which pores are readily recognizable for several successive segments, locations (on left side only) are as follows: xviii, about in line with twenty-first seta; xix, slightly more dorsal; xx, more dorsal still; xxi, in line with twentieth seta; xxii, dorsal to position on xx; xxiii, about in line with twenty-first seta; xxiv, about in line with twenty-fourth seta. First dorsal pore on 5/6 (3), 6/7 (but with pore-like though apparently non-functional marking on 5/6, 3). Clitellar modification of epidermis recognizable at dorsal incisions only in xii–xvii or xviii, but x–xi and xviii or xix to xxiii or xxiv have a red color distinct from the blue of other segments of the body.

Spermathecal pores may each have a tumescent annular lip, and margins of vii–ix in vicinity of pores may be whitened. Female pore median and presetal on xiv.

Male field rather indefinitely demarcated, circular, transversely or longitudinally elliptical, whitened, wrinkled, extending symmetrically across the setal circle, not reaching 17/18–18/19 or crossing slightly onto xvii and xix, reaching laterally into *cg*. On site of setal circle a transverse groove reaches laterally to or nearly to margins of field, the minute male pores in deepened lateral portions of groove. Setae apparently usually lacking between male pores, one or two occasionally present on lateralmost portions of field.

INTERNAL ANATOMY: Gizzard large, pushing several septa posteriorly into funnel shapes. Last hearts in xiii (5).

Seminal vesicles, in both xi and xii, horseshoe-shaped, posterior vesicles pushing 12/13 back into contact with 13/14. Prostates confined to xviii; ducts slender, with slight muscular sheen ectally, *ca.* 2 mm. long, straight or slightly sinuous.

Spermathecal ampulla ovoidal to shortly ellipsoidal, slightly longer than duct which is narrowed slightly and gradually passing ectally. Duct wall muscular, lumen slit-like, shortly elliptical or star-shaped in cross section. One or two slight bulges on median side of duct entally indicate presence of small intramural seminal chambers. A strand of slightly iridescent material usually passes from the sticky sperm mass occupying entalmost portion of duct and ectalmost portion of ampulla into each seminal chamber.

ABNORMALITY: One worm has an extra spermatheca in the right side of ix, with pore on 8/9.

REMARKS: The Dumpep specimens were examined some years ago and are not now available for comparison with the other material. Gora and Dumpep worms appear at present to be conspecific and distinguishable from the Akyab holotype only by the presence of a transverse groove on a ventral portion of the equator of xviii, possibly also by loss, at maturity, of some of the ventral setae (dislocated anteriorly in the Akyab worm). These differences may be significant but do not now appear in themselves to warrant erection of a new species for the northern material. Possibility of geographical races or subspecies in a relatively long (for Burmese species) area perhaps should be considered. The diagnosis tentatively suggested below necessarily includes some

particulars known only from the northern material, and omits mention of the male field.

Stephenson's *m'intoshi* from Cherrapunji, Assam (1924, p. 341), presumably is conspecific with the Dumpep worms, but confirmation is desirable.

DIAGNOSIS: Quadrithecal, spermathecal pores on 7/8–8/9. Female pore median. Nephropores, one pair per segment, in two irregularly zigzagged lines on the dorsum. Setae: 33–44/ii, 54–76/viii, 61–75/xii, 53–66/xx, viii/2–6, xix/2–3. First dorsal pore on 5/6 (6/7). Clitellum (? x–) xii–xvii or xviii (–xxiii or xxiv?). Length, to 310 mm. Diameter, 10–11 mm. (Segments, *ca.* 200?)

Gizzard in vi; intestinal origin in region of 19/20; no typhlosole. Last hearts in xiii. Nephridia, one pair per segment. Holandric, seminal vesicles unpaired and horseshoe-shaped. Prostates confined to xviii. Spermathecae adiverticulate but with seminal chambers in median wall entally of muscular duct.

DISTRIBUTION: Akyab, (to?) Gora, Chindwin district (west to?) Dumpep and Cherrapunji (?) in the Khasi Hills of the Assam Plateau.

2. One clitellate specimen. Nepal; K. N. Sharma.

Ventral setae of xviii as below (3) except that margins of shaft in ornamented region appear to be definitely serrate.

Spermathecal duct longer than (contracted) ampulla an ectal portion of which is bound down around ental end of duct so as to conceal from view a very short and rather narrow neck region. Wall of duct mainly of circular muscle. Lumen of duct small, approximating to slit-like in section, but irregular due to presence of vertical ridges, one of which is much higher than the others.

REMARKS: This specimen and other data concerning it were lost in the sack of Rangoon.

3. One juvenile; District East 2, *ca.* 45 miles northeast of Katmandu, Nepal, at elevation of 4000 to 8000 feet; September-October, 1935; K. N. Sharma.

EXTERNAL CHARACTERISTICS: Length, 203 mm. Diameter, 9 mm. Dorsum apparently blue, but pigment in circular muscle layer red. Ventrum with a faint pink appearance. Setae begin on ii, more widely spaced dorsally; 59/ii, 65/iii, 106/viii, 86/xii, 83/xx, viii/13, xviii/8, xix/8. Nephropores usually not definitely identifiable, a complete set probably not recognized on any segment, but on each of a number of segments either four pores on the dor-

sum or two on the ventrum could be recognized. First dorsal pore on 4/5.

Male field *ca.* 15 intersetal intervals wide, whitened, perhaps very slightly tumescent, with no dislocations of 17/18 and 18/19. Setal circle of xviii continued straight across ventrum (no anterior dislocation), the tips of 14 setae just barely visible in a transverse groove. Another transverse groove, just in front of 18/19, contains the minute male pores, about in line with *d* or *e* setae (location confirmed by tracing prostatic ducts through parietes). Ventral setae of xviii nearly straight, 0.7–0.86 mm. long, with tip bluntly pointed and an ectal portion ornamented with numerous short, fairly closely crowded rows (or circles) of very fine teeth.

INTERNAL ANATOMY: Gizzard large, in vi. Esophagus slender in vii–ix, widened and moniliform in x–xvi, slender again in xvii–xviii, sigmoid in xvi–xviii. Inner wall in vii–ix with low but thick, white, regularly longitudinal ridges, in x–xvi with higher, irregular, more or less lamelliform ridges gorged with blood. Intestinal origin in xix or xx (?). No typhlosole but a median portion of intestinal roof slightly thickened in a fairly regular band 1 mm. wide.

Dorsal vessel (single) bifurcates shortly behind brain. Supra-esophageal vessel formed by median union of anterior bifurcations of hearts of xiii, disappears gradually in x. Subneural vessel at first appears to pass out from under nerve cord in xiv (in xiii continuous with right extra-esophageal) but a slender continuation, under the nerve cord, is recognizable at least into x. Extra-esophageals pass onto ventral face of gut anteriorly in xi, left trunk gradually disappearing posteriorly. Hearts of x–xiii latero-esophageal, bifurcations to dorsal trunk distended with blood. Commissures of vii–ix, lateral loops.

Four or five nephridial funnels definitely identified in each of a number of segments.

Genital organs rudimentary, spermathecae barely protuberant into coelomic cavity. Vas deferens passes into ental end of prostatic duct.

REMARKS: Beddard (1892) referred a second lot, perhaps of only two specimens (see footnote, p. 689), from somewhere in India to his *m'intoshi*. "Beddard's account of these later worms is particularly brief and unsatisfying, and it is difficult to understand, being mixed up with descriptions of several other species and proceeding largely by means of a comparison with *P. inter-*

medius; even the locality is not certain, for while, in the paper itself (Beddard, '92) they appear to be from Seebpore (Sibpur). in his Monograph (Beddard, '95) Beddard speaks of them as being from either Seebpore or Darjiling, the uncertainty being due to his having mislaid his notes" (Stephenson, 1931, p. 175). One of the specimens, labeled "*Perionyx macintoshii*—India," found in the British Museum, was redescribed by Stephenson (1931), necessarily without characterization of the male pore region which had been removed by Beddard.

Meanwhile, Stephenson (1917, p. 383) had identified two, probably abnormal, specimens, from somewhere in the Nepal Valley, as *m'intoshi.* The only other record of the species is of four partially clitellate or clitellate specimens also from Nepal (Leesankhu, Chowtara district; Gates, 1934, p. 265).

It is unlikely that Beddard's specimens were from Sibpur (near Calcutta) unless the species had been accidentally introduced there. With the exception of the Cherrapunji worms mentioned on a previous page, all Indian specimens of known locality have been from Nepal.

The Himalayan material seems to be characterized by larger numbers of setae (78–106/v, 72–124/ix, 76–117/xii, 86–101/xx–xxiii, viii/10), anterior dislocation on xviii of a ventral portion of the setal circle (apparently uninterrupted), possibly by location of clitellum on xiii–xx and also by a somewhat greater size (length to 420 mm., diameter to 13 mm., segments 225–240). No information has been available as to number of nephridia per segment or location of nephropores.

The Katmandu juvenile described above appears to be referable to the same species as other Nepal specimens of *m'intoshi.* If so, the Himalayan form has multiple nephridia and is thereby specifically distinguishable from the Burmese form as now defined. (But note anterior dislocation of a presumably uninterrupted setal circle of xviii in the Akyab holotype. Nevertheless it seems preferable, at present, to assume conspecificity of the Akyab worm with those from Dumpep and Gora rather than those from Nepal.)

The Katmandu juvenile cannot be specifically distinguished from the holotype of *Perionyx dubius* (Stephenson), 1916, also a juvenile and from which the species in now alone known.

In a previous contribution (Gates, 1934, p. 265), as a result of unauthorized and quite unwarranted editorial changes, *L. dubius*

was placed, without qualification, in the synonymy of "*P. macintoshii*." As no proofs were submitted, that and various other changes were not detected until after publication. At the time there certainly was no intention of suggesting more than that *dubius* was a *Perionyx* and that its relationships to the Nepal form needed consideration.

The type locality of *dubius* is Kurseong (near Darjeeling) and thus provides some support for a Darjeeling origin of Beddard's 1892 specimens.

In the *m'intoshi-dubius* complex of giant forms, otherwise quite similar, those with multiple nephridia are phyletically younger than those with a single pair per segment. Adequate characterization of the various forms and determination of the distribution of each can be expected to contribute significantly to solution of problems of zoogeographical relationships of India and the contiguous portion of southeast Asia.

TONOSCOLEX GATES, 1933

Tonoscolex depressus (Gates), 1929?

SPECIMEN EXAMINED: Mansum, Burma; January 23, 1935; one juvenile specimen. Vernay-Hopwood Chindwin Expedition. A.M.N.H. No. 6657.

EXTERNAL CHARACTERISTICS: Length, *ca.* 190 mm. (incomplete posteriorly and not healed). Diameter, *ca.* 5 mm. Prostomium prolobous. A deep postsetal secondary furrow present from v posteriorly, and a deep presetal furrow from vii posteriorly. Setae begin on ii; $ab < cd < bc < aa$, $dd\ ca. = \frac{1}{2}C$. First dorsal pore on 9/10.

Spermathecal pore sites indicated by gray translucent markings on 6/7–7/8, slightly median to *a* lines. Male pores minute, on *b* lines, in seminal grooves.

Each seminal groove runs from a point approximately at site of *a* seta laterally to just beyond *b* line and then posterolaterally just onto xviii about at mid *bc*. Around the anteromedian end of each groove is a very slight tumescence that may be a rudiment of a short, U-shaped ridge, facing laterally.

INTERNAL ANATOMY: Septa 4/5–5/6 membranous, 6/7–11/12 thickly muscular. Typhlosole simply lamelliform, beginning in xiv–xv.

Seminal vesicles juvenile. Prostates flattened, rather strap-shaped, in xvii–xviii, duct from median margin near anterior end.

A filament that appears to represent the vas deferens passes into prostatic duct about one-third of its length from the parietes.

Spermathecae juvenile; the diverticulum somewhat shorter than the main axis, rather pyriform and into anterior face of duct; main axis with little indication of differentiation into ampulla and duct, latter perhaps confined to parietes.

REMARKS: Identification of a single juvenile of a species of *Tonoscolex*, from a locality at which clitellate material of any species of the genus has not been collected, presumably should be rather tentative. However, no indications against identification as *depressus* were recognized.

Tonoscolex oneili (Stephenson), 1914

SPECIMENS EXAMINED: Mansum, Burma; January 23, 1935; one aclitellate specimen (referred to in parentheses below) and one clitellate specimen. Vernay-Hopwood Chindwin Expedition. A.M.N.H. No. 6657.

EXTERNAL CHARACTERISTICS: Length, *ca.* 105 mm. (*ca.* 155 mm.). Diameter, *ca.* 5 mm. Number of segments, *ca.* 105, the anal segment probably not normal and possibly reorganized after posterior amputation (*ca.* 230, posterior portion lacking). Prostomium prolobous. A deep postsetal secondary furrow present from v posteriorly and a deep presetal furrow from vi posteriorly. Setae begin on ii; $ab < cd < bc < aa$, $dd > \frac{1}{2}$ C. First dorsal pore on 10/11 (2). Clitellum on xiii–xv, possibly also xvi, dorsal pores of 13/14–15/16 occluded but sites still obvious, intersegmental furrows visible but more clearly on ventrum.

Spermathecal pores on 6/7–7/8, small, closely paired, longitudinally placed slits reaching slightly onto vii and viii but more onto vi and vii, the region between each pair of slits grayish translucent. (Smaller, almost confined to vi and vii, median region between pair of pores less modified.) Female pores not certainly identified but probably represented by minute, grayish, translucent specks in epidermis of *aa*, about equidistant from each other and the *a* setae. Male pores very small slits, *ca.* in *ab*, and in median portions of seminal grooves (*ca.* at *b* sites and in angles of seminal grooves).

Each seminal groove runs from a point near site of *a* seta of xvii straight laterally about to *b* line and then posterolaterally onto xviii with end pointing at *c* seta. The posterior portion is slightly concave laterally. Just in front of the setal arc of xvii

and the seminal grooves there are two transversely placed, rather ellipsoidal bodies, not quite in contact mesially, and with centers about on the *a* lines. Each of these "tags" can be pushed slightly posteriorly to disclose a transverse, slit-like aperture into a deep invagination. The anterior margin of the aperture is very slightly protuberant as a thin lip, the "tag" presumably a tumescence of posterior lip. On the posterior wall of the invagination is a vertically placed protuberance with smooth surface. The epidermis is modified and with a translucent appearance in a transversely placed area just in front of the invaginations, the posterior margin convex, the anterior margin concave. A smaller, transversely placed area of similar translucence just behind the tags. Each seminal groove is on another area of translucence, diagonally placed. Between those two areas, a midventral region, anteriorly on xviii and posteriorly on xvii, in *bb*, is depressed. No special demarcation of a male field recognizable. (Tags lacking but two rather irregular, slit-like apertures of deep parietal invaginations just in front of anterior ends of seminal grooves.)

INTERNAL ANATOMY: (Enteronephric nephridia first recognized in region of lxx.)

Seminal vesicles of x and xi small, vertically placed, flat bodies on posterior faces of their septa. Prostates in xvii–vxiii, rather strap-shaped but with irregular margins, duct zigzag looped. Over each invagination there is a conspicuous protuberance into coelomic cavity, lumen of invagination not extending above normal parietal level. (No protuberance into coelom over invagination.) Vasa deferentia of a side, apparently separate, join ental end of prostatic duct at edge of gland.

Spermathecae large enough to reach up to level of dorsal face of gizzard; ampulla, indicated by a rather pinkish appearance of its contents, much shorter than, and with its ectal portion bound down around, a narrowed ental portion of duct so that duct and ampulla may appear to be of about the same thickness. Diverticulum, much shorter than duct and rather digitiform, passes into anterior face of duct near parietes. One diverticulum appears to have spermatozoal iridescence. (Spermathecae juvenile, main axis about twice length of diverticulum.)

REMARKS: This species has been known hitherto only from two individuals: the holotype (in poor condition) from the Abor country of Assam, and a specimen from Mayan (near Myitkyina town) that was lost in World War II. The present specimens apparently

differ from the two previous ones as follows: close pairing of spermathecal pores (rather than on or just median to *a* lines), but actual difference is slight; the longitudinal, slit-like shape of spermathecal pores, a characteristic hitherto recorded in the genus for only one species, the giant *T. birmanicus* (Gates), 1927; shape of seminal grooves. In the present specimens the grooves can hardly be called L-shaped as previously, but again differences are slight. Actually, the anterior half of the posterior limb of each groove is approximately parallel to midventral line, only the posterior halves divergent laterally. The deep parietal invaginations just in front of the anterior ends of the grooves and the elongate spermathecal duct, both unrecorded from other species, appear to be so characteristic as to require identification as *oneili* in spite of differences in spermathecal pores and seminal grooves. This would seem to indicate that characteristics of seminal grooves may be less useful taxonomically than was formerly thought.

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